# E08-008: Exclusive Study of Deuteron Electron-disintegration near Threshold

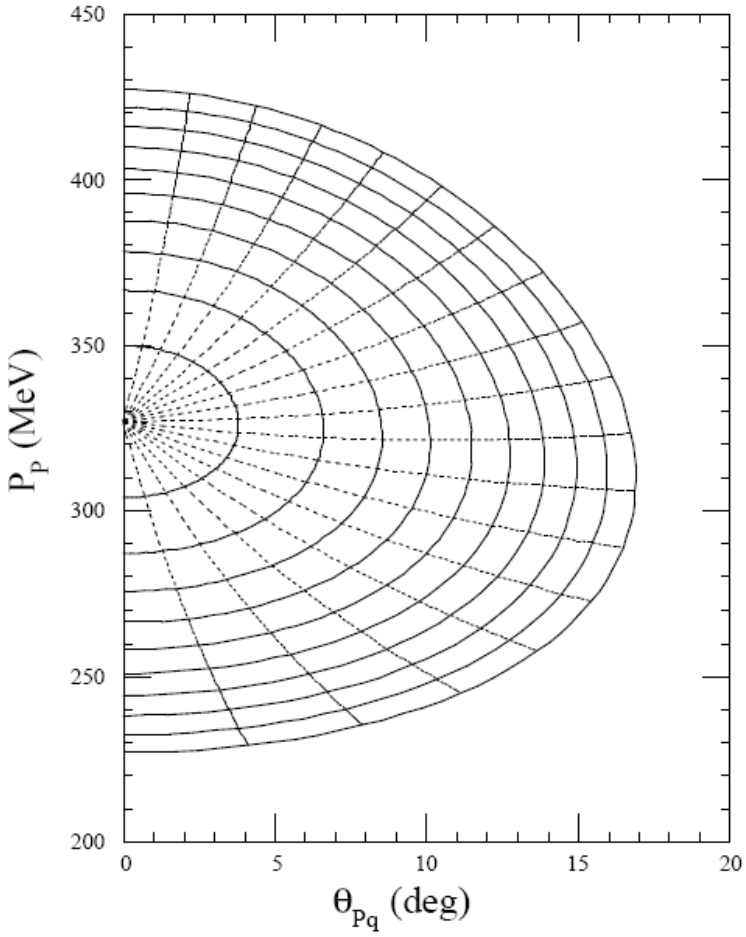
by Douglas Higinbotham

# Motivation

- Simplest Nuclear System
- Insights into nucleon-nucleon interaction
- Short distance structure of the Deuteron not well understood

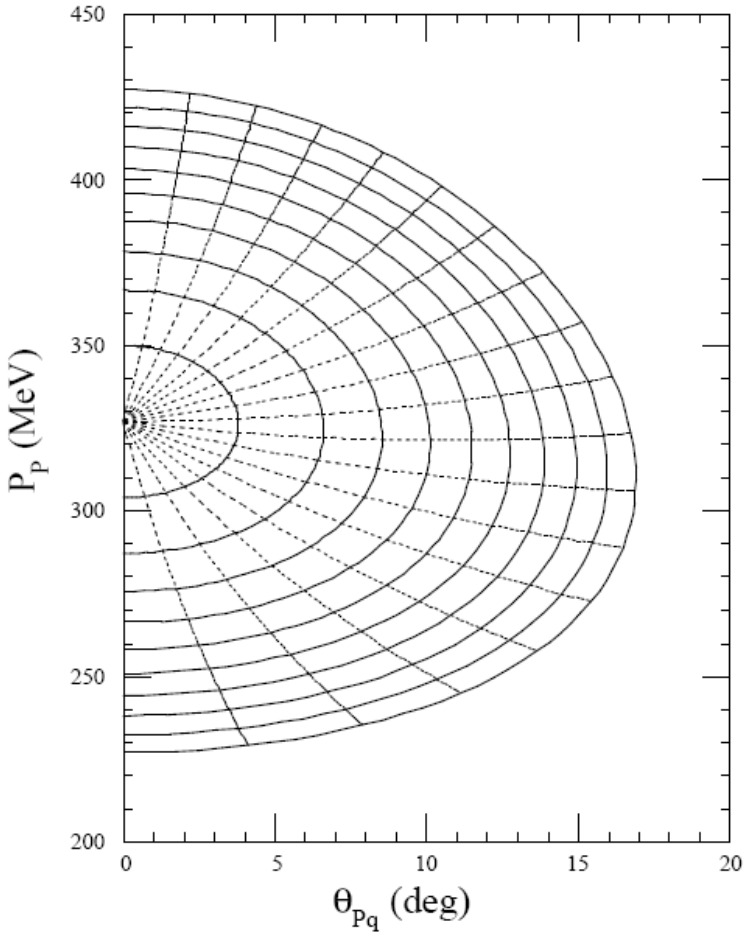
# Original D(e,e'p) Idea

- Originally this experiment was going to use BigBite (proton) and HRS (electron arm)
- Beautiful way to cover a broad phase space near threshold
- Right-HRS (electron) and Left-HRS (proton) was going to be used to get the best possible cross section at threshold



# New D(e,e'p) Idea

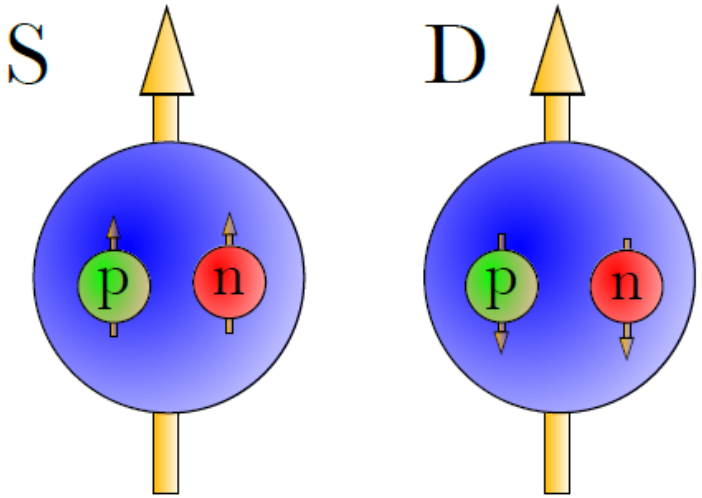
- With limited beamtime, we decided to focus on the threshold part of the experiment with the two HRS
- Adding FPP gives use new physics observables (transferred and induced)
- This focus will create a very unique data set.

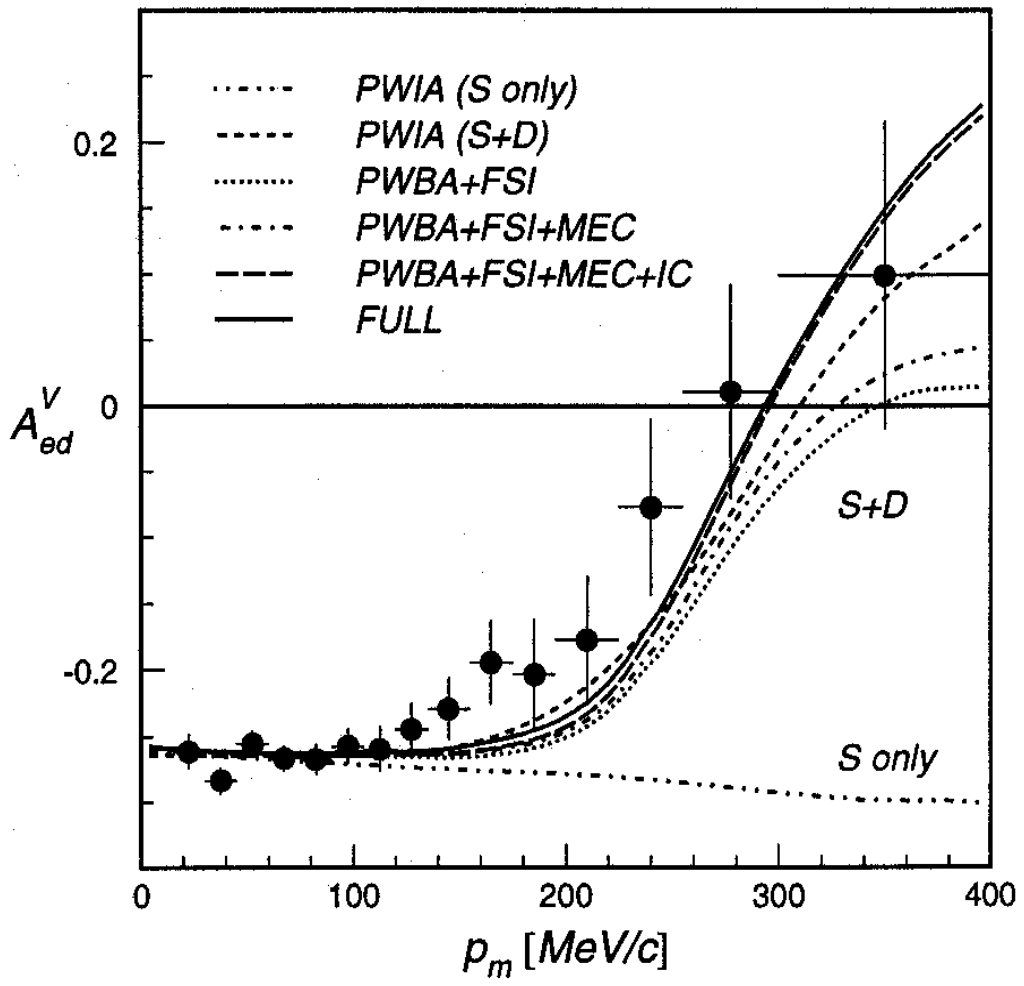


# Deuteron Asymmetry Data

I. Passchier *et al*., Phys. Rev. Lett. **88** (2002)102302.

$^2\vec{\mathrm{H}}(\vec{e},e'p)$



# Beam time allocation

| | $E_e[GeV]$ | $\theta_{HRS}[^\circ]$ | $\theta_{BB/FPP}[^\circ]$ | $Days$ |
|---|---|---|---|---|
| Physics | 2.25 | 16.9 | 71.4 | 5 |
| Set up | | | | 5 (parallel) |
| Total | | | | 5+5 |

Both HRS will be coming back online in mid-February
With the right HRS cool down starting in early January

# Projected Results

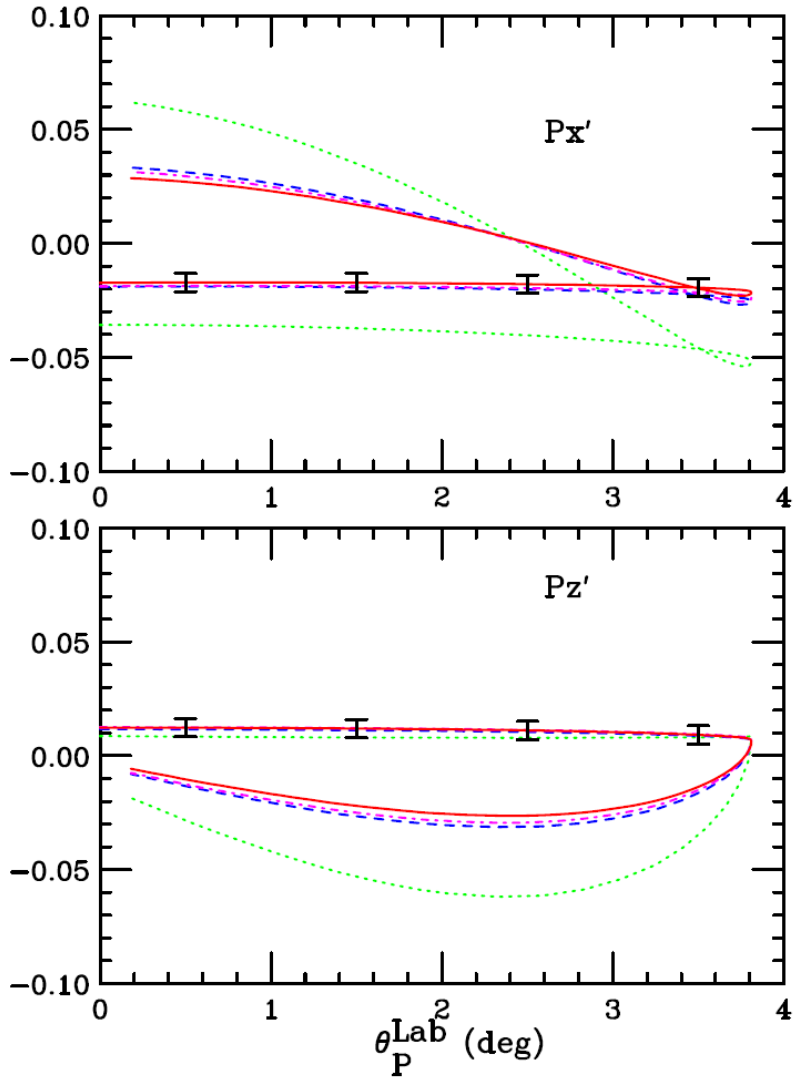
$\Delta W = 0.5\ MeV$

- - - - - - - - *NN*-potential only

– – – – + MEC

– • – • – + IC

– – – – – – + RC = Full



# Projected Results

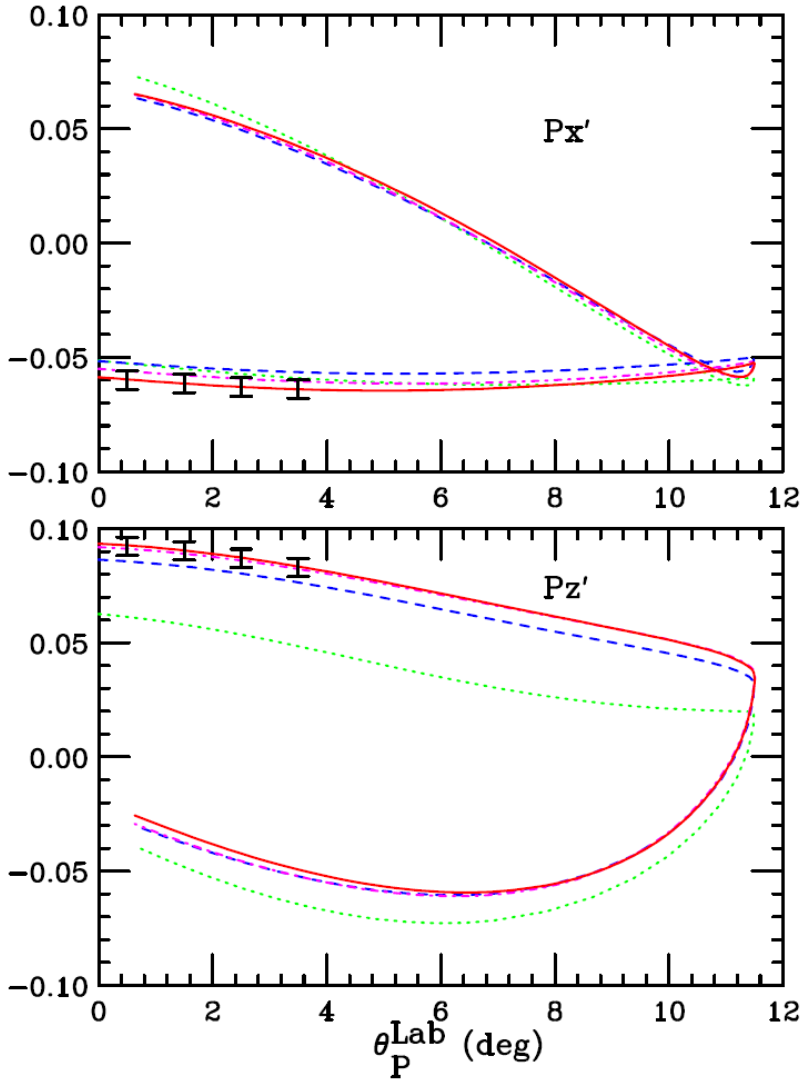
$\Delta W = 4.5\ MeV$

- - - - - - - - *NN*-potential only

– – – – + MEC

– • – • – + IC

– – – – – – + RC = Full



# FPP Chamber Status

- Wires are arranged in sections of 3 by 16
- 10 to 11 sections per wire
- 2016 wires for the 4 planes.
  - All 4 planes checked for continuity, repaired if possible
  - 112 wires currently disconnected
  - Most broken wires (53) on plane 3
  - Electronics checked and repaired
- Checked for leaks
- Currently checking for high voltage and signal

# FPP Improvements

- Small, plastic manifolds for each section of wires.
  - Replacing in the cases of leaks
- Previously used serial system to flow gas
  - Replacing simple tubing system with metal manifold.
  - Each section will have individual valve.
  - Produces parallel gas flow.
- Will be ready to install chambers in January.
- Plans for continued improvement after the experiment.

# Conclusions

- Experiment Focused on threshold deuteron break-up
- Unique look at the nucleon-nucleon interaction in the simplest possible system.
- Using the FPP lets us meet the physics goals of the experiment with a limited about of beam time.
- FFP front chambers have been repaired in preparation for the experiment wth thanks to Bogdan, Albert and Aiden.